PART I

Chapter 1.1 EXECUTIVE SUMMARY

The 2002 305(b) Water Quality Assessment Report describes the water quality conditions in the Commonwealth of Virginia during the time period beginning January 1, 1996 through December 31, 2000. The primary purpose of this report is to satisfy the water quality reporting requirements of the Commonwealth of Virginia under Sections 305(b), 106, 314 and 319 of the Federal Clean Water Act and the Virginia Water Quality Monitoring, Information and Restoration Act.

Virginia has nine major river basins with an estimated 50,415 miles of perennial rivers and streams and approximately 2,462 square miles of estuaries. These figures were calculated utilizing the Environmental Protection Agency (EPA) National Hydrography Database (NHD). This new hydrography database has provided additional geographical refinement of rivers, streams, lakes and estuarine waters in Virginia over the previous River Reach File (RF3) hydrography database used in previous reports. This is the reason that the overall stream mileage in the state has slightly increased from previous reported stream mileage.

The overall water quality for Virginia is assessed based on whether or not the condition of the waterbody of concern permits citizens to safely enjoy the designated uses of the waters as described in the Virginia Water Quality Standards. Table 1.1-1 briefly describes the designated uses and the baseline criteria used in this assessment to demonstrate support of the designated uses.

Table 1.1-1 DESIGNATED USE MATRIX

NO.	DESIGNATED USE	SUPPORT OF USE DEMONSTRATED BY
1	Aquatic Life Use	Conventional Pollutants (Dissolved Oxygen, pH, Temp.); Toxic contaminants in water column; Nutrients and toxic contaminants found in sediments exceeding NOAA's Effects Range -Median Value; Biological evaluation.
2	Fish Consumption Use	Advisories, limiting consumption, or restrictions issued by Virginia Department of Health (VDH); Comparison of fish tissue data to state screening values for toxic pollutants found in Tables 6(a) and 6(b) of the Water Quality Assessment Guidance Manual
3	Shellfish Consumption Use	Restrictive actions for harvesting and marketing of shellfish resources made by Div. of Shellfish Sanitation of VDH.
4	Swimming Use	Conventional Pollutant (Fecal Coliform Bacteria) and/or beach closures issued by VDH
5	Public Water Supply Use	Closures or advisories by VDH; comparison of data to applicable public water supply standards

Types of Data Used in Assessment

The assessment of surface waters and their ability to support the designated use(s) are based on two different categories of water quality information: **monitored data** and/or **evaluated data**.

Monitored data follows an EPA accepted and/or DEQ approved sampling and analysis protocol and comes primarily from monitoring station samples DEQ has collected, analyzed and stored in either the Environmental Protection Agency's STORET database or DEQ's Comprehensive Environmental Database System (CEDS) database. This data includes the analysis of conventional water column samples, sediment samples, fish tissue samples and biological assays.

DEQ sampled 1,680 ambient monitoring stations over the five-year period. Approximately 2,700 additional stations, from other federal, state and/or citizen monitoring programs, were assessed during this reporting period. In previous years, sampling in Virginia targeted point source discharges. The result of this station siting method was to focus the assessment on known or highly suspected water quality problem areas. DEQ has become increasingly aware of potential nonpoint source water quality contamination and has substantially reduced the number of point source targeted stations in favor of a hydrology-based watershed monitoring network, that provides a more geographically comprehensive and less biased assessment of the state's surface waters. Also, DEQ has increased the use of other "quality assured" data provided by several, federal, state and local organizations.

The intent of this change in monitoring strategy is to increase spatial coverage and to produce a more accurate and balanced portrayal of the state's overall water quality conditions. This approach also allows for a better understanding of the impacts associated with various point and nonpoint sources of pollution.

Where monitoring data are not available, **evaluated data** is used. In many cases there is not an accepted protocol to assess the attainment of the individual uses described in the water quality standards. These evaluations can be based on data associated with land use, point source discharges, nonpoint source pollution potential, fishery information, professional judgement, and/or any other relevant water quality information.

In addition to increasing the spatial coverage of the monitoring station network, the agency is also conducting a much more detailed accounting of actual monitored miles associated with each station. For the 2002 assessment DEQ used EPA's Assessment Database (ADB) which provides for a more accurate accounting between monitored miles versus evaluated miles. In past 305(b) reports (pre-2000), the database that was used forced an entire waterbody to be considered monitored if any monitoring occurred within the waterbody. In many cases, only a small fraction of the waterbody was actually monitored, whereas other parts of the waterbody may have only been assessed using evaluated data. This approach inflated the reporting of monitored mileage in past reports. The EPA database allows each segment within a waterbody to be individually listed as evaluated or monitored. Therefore, if a small segment within the waterbody was actually monitored, it can be designated as such and the remainder of the waterbody would be reported as a distinct segment and listed as evaluated and/or not assessed.

Assessment Method Used In This Report

The overall goal of the assessment program is to properly identify problem waters and then to design and implement a water quality management plan to return these waters to their designated uses.

The assessment approach used in this report begins by comparing monitoring data against the regulatory standard for each parameter. Based upon that comparison, the water segment is placed in one of four assessment categories based upon the degree of support of the designated uses for that water:

- Fully Supporting
- Fully Supporting but Threatened
- Partially Supporting
- Not Supporting

In order to properly assess water quality data several factors need to be considered.

1. Because environmental conditions vary, it is possible that monitoring data may violate a water quality standard without signaling a significant environmental problem causing the loss of designated uses. Consequently, while some measurements might violate water quality standards, a low violation rate is an insufficient reason to classify a stream as failing its designated use. The assessment challenge is to interpret the limited amount of sample data available to determine whether an observed violation of standards warrants classifying a segment as not fully supporting its designated uses. The water quality samples taken can be affected by both human activity and/or natural/background conditions.

2. There are certain acceptable tolerances for violations. For example, an occasional violation of

the dissolved oxygen standard, even if caused by human activity may not be critical to the aquatic environment.

3. Measurement errors in the analysis of the samples collected could be yet another reason why the numeric standard might appear to be violated in a sample.

In performing the assessment of chemical data summarized in this report, DEQ used the EPA Percent Method with a slight modification for small datasets. For additional information on the methodologies used in the assessment see Chapter 3.2.

The EPA Percent Method

National guidance issued by EPA recommends that states use an assessment method for the 305(b) report based on assumptions about the kind and frequency of data needed to support such an assessment. The object is to indicate whether waters are fully, partially, or non-supporting of the designated uses. For this purpose, EPA has proposed two violation thresholds for conventional pollutants: a violation rate greater than 10% and less than 25% places the waters into the partially supporting category and a 25% or greater violation rate places the waters into the not supporting category. These percentages are fixed.

For the 303(d) list of Impaired Waters, the guidelines require a waterbody segment to be listed as impaired if more than 10% of the samples violate the standard (i.e. if it is classified as either partially supporting or not supporting). In effect, the EPA assessment guidelines imply that the violation of a numeric criterion is acceptable in 10% of the samples taken. DEQ has used the EPA percent method but has slightly modified the threshold for listing a water as impaired for small datasets to require at least two violations before a water can be considered impaired.

Results – Rivers and Streams

This report presents the results of the assessment of monitored water quality in approximately 9,805 (19.4%) of the total 50,415 miles of the state's free-flowing streams and rivers. The remaining stream miles were evaluated.

The following table presents the results of the 2002 assessment for the river miles assessed.

ASSESSMENT RESULTS FOR RIVERS AND STREAMS					
Degree of Use Support	**Evaluated Miles**	(%)	**Monitored Miles**	(%)	**Total Miles**
Fully Support All Assessed Uses	36,129	88.8	4,541	11.2	40,670
Fully Support All Assessed Uses but Threatened for at Least One Use	3,964	80.7	944	19.3	4,908
Impaired for One or More Uses	517	10.7	4,321	89.3	4,838
Total Assessed	40,610	80.6	9,805	19.4	50,415

As in previous reports, the "fully supporting but threatened" category has been used. This category is used to describe a waterbody for which a particular use is currently supported, but may not be supported in the future. These assessments are based on evaluated and/or other related data, especially those associated with nonpoint source impacts. See Chapter 3.2 for additional information on the determination of fully supporting but threatened waters. As part of the ongoing assessment process, continued monitoring of these threatened waters should provide better, more conclusive data for future assessments.

The leading cause of impairment of designated uses in Virginia's rivers and streams is violation of the fecal coliform bacteria standards. Agricultural practices appear to be one of the primary sources contributing to the bacteria standards violations. However, urban runoff, leaking sanitary sewers, failing septic tanks, domestic animals and even wildlife can be significant contributing sources.

Results – Lakes and Reservoirs

Virginia has 104 significant (public water supply and/or > 100 acres), publicly owned lakes and reservoirs with an estimated 148,462 total acres. Of these, 127,618 (86.0%) acres were monitored and assessed during the reporting period. The remaining acres were evaluated.

The following table presents the results from the 2002 assessment of lakes and reservoirs.

ASSESSMENT RESULTS FOR LAKES AND RESERVOIRS					
Degree of Use Support	**Evaluated Acres**	(%)	**Monitored Acres**	(%)	**Total Acres**
Fully Support All Assessed Uses	11,517	55.2	9,335	44.8	20,851
Fully Support All Assessed Uses but Threatened for at Least One Use	9,145	75.9	2,908	24.1	12,053
Impaired for One or More Uses	182	0.2	115,376	99.8	115,558
Total Assessed	20,843	14	127,618	86	148,462

Many of these waters were not fully supporting for aquatic life use, primarily due to stratification in the lakes causing dissolved oxygen depletion. Also, exceedences of the fish tissue standard for PCB was a major cause of fish consumption use impairment in lakes and reservoirs.

Results – Tidal Estuaries

This report presents the results of the assessment of monitored water quality in approximately 2,140 (87%) of the total 2,462 square miles of Virginia's tidal estuaries. The remaining estuarine areas were evaluated.

The following table presents the results from the 2002 assessment of tidal estuaries.

ASSESSMENT RESULTS FOR TIDAL ESTUARIES					
Degree of Use Support	**Evaluated Sq. Miles**	(%)	**Monitored Sq. Miles**	(%)	**Total Sq. Miles**
Fully Support All Assessed Uses	127	85	23	15	150
Fully Support All Assessed Uses but Threatened for at Least One Use	165	25	496	75	661
Impaired for One or More Uses	34	2	1,655	98	1,689
Total Assessed	322	13	2,140	87	2,462

The leading cause of impairment in Virginia's estuarine waters is violation of the Dissolved Oxygen Standard associated with aquatic life use. Another leading cause of impairment is violations of the fecal coliform bacteria standard associated with shellfish consumption advisories.

Based on limited available information, all of Virginia's 120 miles of the Atlantic Ocean Coastal Waters were evaluated as fully supporting Virginia's designated uses.